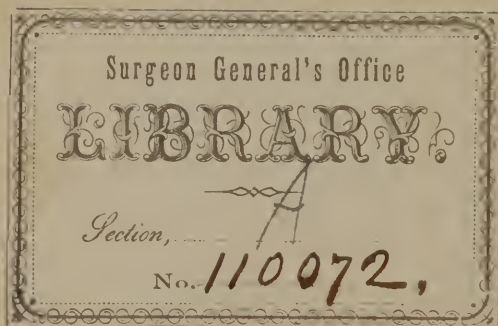


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1857

MIND, LIFE AND MOTION.

Scientific and Medical
Books, and all objects
Natural History.
E. FOOTE, M. D.
23 Belmont Ave.,
Philadelphia, Pa.



Vanderburgh, Editorial

MIND, LIFE, AND MOTION;

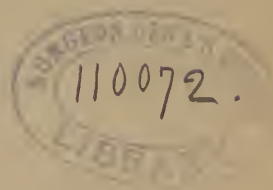
WITH THE

L A W

OF THEIR RELATIONS

TO

M A T T E R .



NEW YORK:
JOHN F. TROW, PRINTER,
377 & 379 BROADWAY.
1857.

P R E F A T O R Y.

WE began this work under the impulse of a transient conversation in the Rail Cars, and with no other design than to show the uncertainty of human testimony. This done, it suggested the error of Sir Isaac Newton in deducing a universal law from a centripetal force. In proving this error, we were forced to deny the acknowledged law of science, namely, that matter, or masses of matter, or atoms, or aggregates of atoms, were essentially inert.

And we took the ground that oxygen was the original cause of matter and motion, and its mechanico-vital force the proximate cause of all the phenomena of their changing relations.

Having started on a motive power, its eccentric force must, of necessity, change the relations of all known sciences that were governed by a concentric law; and we find in closing, that we have thrown all existing sciences, mental, mechanical, metaphysical, philosophical, astronomical, chemical and physiological into fragments, and arranged them according to their relations under a general law, and made

man the focal centre of them all. We began with our first progenitor, fifty-eight centuries back, and have followed his race till we have overtaken Professor Draper, who has done for physiology what Sir Isaac Newton did for astronomy. He has written the most brilliant exposition of phenomenal relations known to science, and we now acknowledge him to be our leader, while we state what we have done *a posteriori*. We have been floating down on the waters of life, while Professor Draper has chosen the safer course on dry land.

In him will be found the solid material—in us, the fluids and gases; and those who have not studied the physical geography of the sea may find some interest in its soundings. If the work had been foreshadowed, its plan would have been different. The law of causation would have stood first in its order, with the problem of motion as its proximate cause. The law of animal life would have followed, and then human life and human mind would have stood next in the proper order of their succession. If the work is read, it may be taken as it is—if studied, it had better be taken up in the order indicated, and the abstruse law of dual relations which governs the whole, must be thoroughly understood, to derive any pleasure or profit from the study.

UNCERTAINTY OF HUMAN TESTIMONY:
CONCLUSIONS NOT JUDGMENTS.

A LETTER

TO

HON. W^M. KENT.

NEW YORK:
JOHN F. TROW, PRINTER,
377 & 379 BROADWAY,
1857.



ENTERED, according to Act of Congress, in the year 1857, by
JOHN F. TROW,
in the Clerk's Office of the District Court of the United States for the Southern
District of New York.

LETTER.

HON. WM. KENT.

MY DEAR SIR,—I have delayed, but not forgotten, the promise made in the rail-cars, that I would write out for you the physiology of the mind in proof of the uncertainty of human testimony.

To reach this proof, we need not trouble you with the whole of the mind's physiology, but with that part of it only which will lay before you the simplest form of its working principle.

The position that the human mind now occupies, in this age of the world, is behind the times in which we live, and is due to the indolent delusion that it was designed, by its Great Author, not to become a problem for solution by the subjects of its exercise, and hence, so far as its working principle is known, we stand now where we did *ab initio*.

The first chemistry of the mind lies still in the

old garden where our first parents left it, and the second edition is yet unwritten,—the degrees of variation in the mind, from its first state, being due to the polish it has received in the progress of civilization and refinement. But yet this polish, that is every where apparent, is not the contingent or accidental thing it appears to be.

Bacon's imagination painted to his mind the method of its own working principle; and this is called the Baconian philosophy, when in truth it was the philosophy of mind before he was born, and is now held in common by the race; and the degrees of deviation from Bacon's standard makes up the varieties and species of the human family. The human mind works by a Law as absolute as that which the Sun gives to its satellites, while its apparent confusion leaps into harmony at the moment we discover the Law. Every daguerreotype that the mind throws off from itself is a process of reasoning by induction, approaching nearer and nearer a First Cause; but guarded with the rule that by this process we can never reach it.

Could we leap over this clause in the Law, it would raise the curtain, and we should be demonstrating problems of infinite instead of finite relations. It is no wonder, then, that the mind should stand for so many centuries on the threshold of its

daguerreotype, with its working principle undisclosed.

Metaphysics must ever remain a curiosity while the philosophy of mind is based on its phenomena, which are so rapidly transitive that they cannot be studied, while the faculties of the mind from which the phenomena spring are *fixtures*, and it is only necessary to know what *they are*, where they are, and the order of succession in which they move, and the *phenomena* of mind are given. You will see at a glance, as the Faculties are fixtures, they must hold relations to matter, and while the phenomena have no materiality it lands us at once on a physico-mental platform.

The human frame, physically considered, is the most beautiful, compact, and effective machinery known to science ; and all machinery copied from its model is the most efficient, enduring and successful. The mind without any knowledge of its own construction instinctively copies from its own model, and each pattern it throws off brings it nearer and nearer to a First Cause, and hence it is always working on the principle of induction.

E. G.—In the first necessities of life, the first water-wheel was turned on its own axis, by this outward source of motion.

The wheat was ground in the basement below,

and the powder sent aloft, to be cooled, bolted, and separated into fine flour—a good general model of the working power of the mind. By the gradual yet sure process of induction, this wheel is now turned by an inward source of motion, and the steam engine boasts of all the motive powers of the human frame, barring its first cause, that of sensation. Give it sensation, and, like its prototype, it would have voluntary motion; but wanting sensation, the force is supplied by combustion (in another form), and it moves on by the force applied, without the fatigue and exhaustion attendant on the combustion of sensations. Now, if the anatomist had turned machinist, and constructed the steam engine from the study of his own model, it would not seem so marvellous; but that machinists of every degree of varied attainment, should be throwing off copies, from their own minds, till the achievement was attained, without any definite knowledge of the model they were working after, shows inductive philosophy to be the rule of the mind's action.

INSTINCTS OF THE MIND—WHAT ARE THEY?

Sensation, consciousness of *sensation*, association, memory, imagination, will, and conscience.

These seven faculties constitute the instincts of

the mind, or, what is synonymous, the *sensational mind*, and this mind is founded in the sensations, feelings, and passions, while the pure intellect, the reason and the judgment, has its chamber where the feelings and passions are shut off.

The mind thus divided into two parts holds two sovereignties, with their mutual and dependent relations, and is in all respects a Republic.

INSTINCTS OF THE MIND—WHERE ARE THEY?

Experiments show that they are where the machinist puts his working power, below, in the *Solar Circle*, near the centre of the trunk of the body, and from which nine pairs of nerves radiate to every part of the frame except the brain, and hence this chamber, the seat of the pure intellect, is shut off from sensation.

The order of succession in which the instincts, or faculties of the sensational mind move, are shown by the following example of their method of coming to a conclusion.

LET AVARICE BE THE EXAMPLE.

Avarice produces and maintains a strong sensation; the vivid *consciousness* of the sensation *asso-*

ciates gain as the chief good. The *memory* posts him up in what he has, while the *imagination*, the devising, cunning, deceitful, and inventive faculty of the mind, and the only faculty that gathers in and supplies all the material—but it does more, it spreads them artfully over the feelings, in the most fanciful manner, and determines the *Will* to a choice of expedients.

This is the undeviating order of succession, in which these faculties move to their conclusion, and reveals to you the startling fact, that they come to their conclusion before the *judgment* is reached; and hence the uncertainty of human testimony. We are instinctively struck with alarm when we see the *will*, the concluding and executive power of the mind, deriving all its authority from the feelings and passions, and in the full exercise of its official acts before the judgment is reached.

And yet this is true of man, the subject of its rule, and he has no escape from the Law. Is it not a condition to excite our commiserating sympathy, instead of the stern judgments awarded to it?

If we had not yet passed through this problem of the mind, and learned that it was constructed, not on a *fixed*, but on a principle of *changing relations*, by which an endless progression is secured to it, we should marvel at its low beginning, and in

spite of its Great Author be led to doubt the wisdom of its construction ; but as we proceed in our analysis, the facts will prove that the mind could be no otherwise constructed and leave man in his position, in the great chain of causation, which he was designed from the beginning to occupy.

ANALYSES.

SENSATION—WHAT IS IT?

When matter reaches that point of combination where four-fifths of its weight is water, *sensation* begins, and in a structure so varied and complex as the human system, where every differing organ is made different by the number of combinations that enter into its composition, each organ must have its different sensations, and necessarily its own language of pain.

Of these *sensations* it must be *conscious*, and the *Association* reflects the contrasts and resemblances of these feelings back upon the sensation itself, while the memory, beholding only the past, recalls it, and is seen taking notes of the present ; now the *imagination* comes next in its order, and

the door of the future is opened to the mind, and having four antecedent faculties, spreads itself over a wider field of vision, and admits of a closer analysis.

IMAGINATION—WHAT IS IT?

It is the constructing faculty of the mind, and furnishes all its material, and it must needs take its position before the Will, to supply matter for the *Will* to act upon. To our finite vision this would seem to be the last faculty to be intrusted with the destiny of the mind, as it gathers indiscriminately from all sources.

Objects of every conceivable character, both true and false, are gathered up and deposited among the feelings. It is acting as much in obedience to its own nature in perverting mental associations as in cultivating the most sublime truths. Unrestrained by time or distance, it is familiar with all scenes and present in all places.

ITS FALSE OBJECTS.

It would seem that the instincts of the mind might progressively acquire, by experience and observation, the power of detecting a false object when

introduced by the imagination into its associations; but this presumption fails when we examine it, as there is another and a deeper ground of delusion undisclosed.

“When the imagination introduces a false object, the accompanying sensation, or emotion produced by it, is as *real* as if the object itself were true, and the pleasurable emotion, if it be one, is sent forward among the social feelings and entertained by them all. The delusion here arises from the reality of the emotion being produced by a false object, so that the mind, instead of being capable of analyzing the object, is itself deceived by the sensation which the object produces.”*

This being the natural infirmity of the imagination, we have only to adjust it to a higher key, and spiritualism is the inevitable consequence. Yet the Omniscient Eye foresaw that if this faculty had not been adjusted to this principle, the object of man's creation would be defeated, as it is the only faculty which he can send forward to futurity and return with its report.

Deprived of this power, as it is now adjusted, we could not anticipate coming events. We should be stationary in the world of mind and matter, con-

* The root of insanity.

templating only our past experience, while the coming moment, with its coming hour, would be the threshold of darkness, into which no ray of light could cast forward the glimmering of a hope, and no effort of mind could dispel the coming gloom. There could be no poets, no philosophers, no men of genius, no examination of the heavens, and no worship of God, and man would have been made in vain.

WILL—WHAT IS IT?

While the imagination never sleeps and never rests from its labors, in drawing pictures to the feelings for the *Will* to act upon, yet the *Will*, passively obedient to the antecedent feelings, sets up its pretensions, and plays the most prominent part in our mental economy, by obviously acting in behalf of a final judgment, when the judgment has not been consulted. Our analysis must set its seal on these pretensions.

One of the best logicians of the age, and one from whom it pains me to differ, has made the Will the starting point of mind, conferring on it, independent volition, with the power of choosing, or refusing, and resolving it into all responsibility. If we grant this, where does it land us? The Will would stand an isolated faculty without a cause in

the construction of the mind ; would leap over the limitations of the Law of mind, repudiate all agency and acknowledge no dependence whatever. Having begun to exist, it must have a cause, and this cause is found in its prior relations ; and it must be conceded that they, the *sensations*, *associations*, *memory*, and *imagination* determine the *Will*, as the intensity of force derived from these feelings, whatever they may be.

It is true of the *Will* that, in its executive capacity, it is always in command ; but this command is a power derived from the imagination, and both are subject to sensation, so that the antecedent circumstances determine its action, and the succeeding circumstances are but the continuation of the preceding circumstances that determine it, and hence the *Will* has no responsibility.

THE CONSCIENCE—WHAT IS IT?

The analysis of this faculty closes our inquest of the instincts of the mind.

On the verge of the *Will* sets the *Conscience*, not in the attitude of command, not as counsellor, not as adviser, but with a silent expression of its sense of wrong to restrain the *Will*.

Of itself it can do nothing, and unless it can

alter or enlist sensation and the imagination in its behalf it is powerless. The order of its succession, and the position it occupies in the final development of the instincts of the mind, would give it the command of the *Will*, if it could claim to be one of the primitive faculties, designed to complete the structure of its moral relations.

But it must strike the observer, that the conscience is not a primitive, but a contingent faculty of mind, and could not be developed but for a prior transgression.

If man had not sinned, the sensation of a conscience would be unfelt, and the power of a conscience undeveloped and unknown.

The rudimental antecedents of the conscience, instead of rising from sensation, as its companions do, is ingrafted, and rises out of consciousness, the first product of sensation.

If it could trace its relations in a direct line back to sensation, it would stand on a higher footing than its antecedent relations, and command the *Will*. But officially considered, the conscience is a feeling of the mind, standing in associated relations to, and growing out of its antecedent relations back to consciousness, of which it is itself a part, deriving its power and authority directly from its prior relations. Now, sensation being the starting-point

of all the primitive faculties, an examination of its power will give us the probabilities of the success of its command over the feelings of the mind when the conscience stands opposed to it. Sensation has no stand-point. It fluctuates in all the extremes of an undulating sea. When standing at its ordinary maximum, in its unruffled dignity and repose, *sensation*, *association*, *memory*, *imagination* and *will* are working at their ordinary rates of motion, and the conscience feels at ease; but as we contemplate this equanimity, we know not when the storm may rise to transform its beauty into darkness and terror.

When sensation is touched by anger, the feelings are distorted with revenge; if chafed a little more, anger becomes rage, a still lower passion, unregulated and uncontrolled by the senses.

Our expectations, then, that a conscience thus situated can retain its command, is founded not in its own powers but in the moderation of the temperament it is called on to oppose.

We have now closed our analysis of the instincts of the mind, and shown you their working power. You have seen, from the vividness of its perceptions, it is always foremost on the theatre of mental action, and pre-occupies the mind by drawing the first conclusion, and by the rapid energy of its associa-

tions seems to set aside the supervisory power and authority of the pure intellect.

A definite conclusion being thus hurried into, the mind, through the feelings and passions, takes the mind by surprise, and it is no wonder that inferences from association in agreement should, by the majority of minds, be mistaken for a judgment. Yet in this way ninety-nine hundredths of the so-called judgments of men are made up. If the first inference fails to make a conclusion it makes a bias, if the second inference corresponds the bias is increased, and if the third inference is in agreement the conclusion is formed, and mistaken for a judgment. Now, no inference, nor any given number of inferences, however they may coincide, can of themselves form a judgment, as the conclusion is come to before the judgment is reached. It is from these *conclusions* that are drawn from the feelings and passions, from which human testimony is taken. You have seen in the analysis of the imagination, which supplies all the material for testimony, how surely it is deceived by the sensations which a false object produces, and hence how surely you may be misled by the honest conviction of your witness.

PURE INTELLECT—WHAT IS IT?

It is the reason and the judgment. It is but a just and reasonable expectation that our accountability should be found, not in the lower range of our faculties, but in the higher attributes of the pure intellect, for these alone can govern the temperament and the heart. The brain, the seat of the pure intellect, we have stated, has no nerves; they go to it but not into it, and hence the door of this chamber is closed to sensation. The brain may be lacerated, torn and cut in pieces, while the subject of it is in full possession of his senses, and be at the same time unconscious of the surgeon's hand. If sensation was there, the act of reasoning would excite emotion, and disturb the logic. It is here away from sensation that subtle truths are weighed in the balance, undisturbed by the feelings, and where rights and obligations are compared, separated and analyzed by the reason and the judgment, and where they are found to be co-equal, co-existent, and co-eternal. It is here that our obligations are weighed that render us accountable beings.

Judgment and justice is the operation of its ways, spreading their relations with its growth and interweaving them with all the mutual relations

which bind man to his fellow-being, and that higher relation which binds his faithful agency to his God.

"It is seen that the mind thus made up and finished has two modes of coming to a conclusion. The one, by contingency, where the materials are gathered from the feelings and passions, and where truth may be found by accident; the other, by analogy, where truth is found by a process of reasoning which forms a judgment.

It is at once seen that faculties so different in their working power, but more especially in their rates of motion, cannot have the same focal centre for their different theatres of action.

The vivid senses must have a vivid centre, whose organic transitions are in exact correspondence with its rapid motions, while the reason and the judgment must have a table on which to write out the slow record of its evidence."

OUR MOTIVES.

The analysis of motives will exhibit the instincts and pure intellect working together in their mutual and dependent relation.

As motives constitute the crime, how are they to be analyzed? It would seem to be impossible; and instead of attempting it with its flood of feel-

ings on it, go back and seize the sensation before it suborns the other feelings; examine it and take its measure, and see what sort of fascination the *association* has thrown over it, with its contrasts and resemblances. Let the memory call up its records of the past, and watch its notations of the present, and then turn to the imagination, that scavenger of the mind, and see what sort of material it is gathering in to feed the flame, and in this assemblage you have the weight and measure of impulse to be thrown into the Will, and this will enable you to judge of the restraining power of the Conscience over the exercise of its official acts.

If the Conscience fails, call upon the reason to arrange the facts, and the judgment will pass sentence and close the final award.

We have now given you the bald machinery of the human mind, and painted it to represent the witness on your stand.

It is a naked picture, that excites both our sympathy and surprise, when contemplated in these relations; but when we study these faculties, as compounds of each other, in the lofty humility of man, the phenomena clothes him with beauty, and makes him the image and likeness of his Maker.

MEDICUS.

December 23d, 1856.

PROBLEM OF MOTION.

INTRODUCTION.

It seems to be going a great way from our subject to search for the errors of medical science in Sir Isaac Newton's attraction of gravitation; but whatever may be the obligations of the world to that great man, it will appear that by isolating gravitation from other forces, and from this deducing a universal law, he has planted an error in science that has awed medical opinions into submission, till public opinion is staggering amidst all the *isms* of the day.

GRAVITATION—WHAT IS IT?

Man, the monarch of matter, and the great object of creation, is the measure of all things here below; and it is by his model that we expect to demonstrate

the problem of motion, and show that matter is not moved by attraction, but by a motive power with gravity to balance it. In animal life the force makes its own gravity, and the balance between force and gravity adjusts itself. When his vital forces are adjusted, man is unconscious of his gravity, as he has just enough to balance his force; but as the force of life passes away, by disease or by age, gravity is felt, and comes to be the burden of the *remaining force* of life. In the first case, his limbs must be moved by another; in the last, his body is supported by his cane. Readjust his forces, and his gravity or weight is unfelt and unknown. It is the folly of the machinist to make more weight than his force can carry; but Omniscience adjusts its forces with precision, and every planet that revolves on its axis will be found to have just gravity enough to balance its forces. The aeronaut has given an example—he takes hydrogen, one of the forces that supports this globe in space, and puts it into a balloon, and throws himself into the parachute as a make-weight to balance the force, and moves off in space like a young planet, with this difference, that he cannot direct his motion, while the planet's self-adjusting force within gives it its direction, with which gravity has nothing to do but to steady its motion. But the advocate for gravity will

say, your theory may be very well, yet, in spite of it, place a man at 30 feet elevation in the air, with no support, and he will inevitably fall to the ground. True, the fact is admitted, but his gravity has nothing to do with the fact; the *forces are unequal*; equalize the forces, and instead of falling to the ground, he would be thrown on some other planet. The experiment of putting two blocks of wood of equal magnitude in contact, on the surface of smooth water, that repel each other, proves this force, and we leave the attraction of gravitation here, to await its destiny, and return to our first proposition, viz.

FORCE IN *MATTER*—WHAT IS IT?

In the discussion of the mind, we found the force to be physico-mental. In the discussion of matter, we shall state it to be mechanico-vital, and this problem, which comprehends within its grasp *all other problems*, is the

PROBLEM OF LIFE.

Our general postulate may be taken for granted, that oxygen is a *mechanico-vital force*, and is the *original element, or first thing that was made, and in it, lies the secondary cause of all things, with the*

germ of their inevitable dissolution. Oxygen has been hitherto considered exclusively a chemical agent, overlooking the great fact that its first property, apparent to the senses, is *mechanical*, and consists in its permanent elasticity. Elasticity and permanent elasticity is the difference between a finite and infinite force. Caoutchouc is an elastic force permanently at rest, but oxygen is an elastic force permanently in motion, and as its relative proportion is greater than that of all other substances in nature, it is a force fitted to the mechanism of the universe, with power to move and maintain its ponderous machinery in perpetual motion. Being permanently elastic, it can never be brought to a point of rest; as permanent elasticity working by law, is a force of differing intensities in different directions, varying its strength to the force applied, whether it be moulding an atom, or commanding a world.

SECONDLY.

It is the supporter of all combustion, and yet is itself incombustible, properties that seem to confer on it the power of the right hand of Omnipotence, always giving without loss, for ever supplying without diminution. When we look to the field of its exercise, and the dominion of its power over

matter, and see that combustion is the active state of the passive changes that are incessantly going forward in the succession of all phenomena among the atoms of matter in the physical world, we discern the cause, as well as the necessity, of this imperishable endowment.

OXYGEN THE CAUSE OF ATTRACTION.

The component parts of all matter are the gases of oxygen, hydrogen, carbon, and nitrogen, of which oxygen forms so distinguished a part. In order to explain the force of its attraction, we must measure the force of the mutual relations of oxygen with its attendant gases, and this will show which of them holds the sovereign power over the tendencies of matter. The relative force in which these gases stand to each other, apart from other matter, is as follows: oxygen, 16; hydrogen, 1; nitrogen, 14; carbon, 6; that is, oxygen is fifteen times heavier than hydrogen, nearly three times heavier than carbon, and as sixteen is to fourteen heavier than nitrogen, oxygen being the heaviest of the gases. Now to measure the force of their mutual attraction we must measure the velocity with which they approach each other. The velocity with which all bodies approach each other by mutual attraction, is

inversely, as the quantity or masses of matter. Thus the velocity with which the lighter body approaches the heavier, is greater than that with which the heavier body approaches the lighter. In the mutual attraction of the gases, then, oxygen stands as the greatest attracting force. Now when we come to consider the great disproportion of hydrogen, carbon, and nitrogen, to oxygen, in the masses of matter, the amount of attraction can only be measured by the amount of oxygen in all nature. It was this overwhelming proof that misled Sir Isaac Newton to the error, that attraction was the primitive element in matter, and that it was the forming and sustaining law of the universe.

But the question might have been as appropriately asked in his day, as in our own, whether attraction was not a derived force, held in obedience to some antecedent power. The directive tendency of this force to bring all masses of matter to a point of rest, would seem to have urged upon the mind of man the early necessity of searching for some other cause of motion. *“For the mutual attraction of the particles of matter are not incipiently attractive. When the atoms come to be situated near each other, their action becomes positive, and changes from attractive to repulsive, and alternate transitions from one state to another repeatedly*

occurs within very narrow limits. Still nearer its centre, the power exerted is invariably repulsive, augmenting in proportion to proximity, else matter must permanently collapse." All masses of matter then, without regard to size, from the atom to the globe we occupy, have their centres *invariably repulsive*, while this repulsive or centrifugal force, is equipoised by the mighty force of attraction, which binds each atom to the next in order, and holds the whole universe together. Every atom of matter then consists of a certain force of differing intensities, in different directions, which repel particles directly as the mass, and inversely as the squares of the distance. We see then that the same law which makes a tear or a dew-drop, makes a world; and having reached the law which makes a world, we turn from the spectacle of its beauty and its grandeur to contemplate the germ of its inevitable dissolution.

Our general postulate may now be taken, that repulsion and attraction are compounds of each other, and are co-existent and co-equal forces, with this difference, that attraction is the *weaker power*, and can only be maintained by an accumulation of material, by which all bodies grow; that when any body or any substance in nature can accumulate no more material, the attractive force must begin to

give way, and the motive power will cause its dissolution, by repelling its particles from each other.

Let Sir Isaac Newton's apple, by which he demonstrated the law of the attraction of gravitation, be the example. The infant apple is attracted to the tree as if by a magnet, till it can accumulate no more material, and having reached a condition of repose by perfect combination, (a condition that no substance in nature can bear,) attraction gives way, and the force that nourished it *being its repelling power*, throws it from its parent stem, and it falls to the ground, and is dissolved by the force that repels its atoms from each other.

HOW THE EARTH GROWS.

It is known that all vegetable life, the grass that clothes the earth with green, the flowers that adorn it, the shrubs which beautify it, the trees exalted above the rest, catching the first rays of the morning light, and bowing their graceful arches to the setting sun, gather one half their substance from the air they breathe. All these, with the exception of the evergreens,* circulate water in their

* The evergreens circulate gum, which is a non-conductor of heat, and retaining their caloric in the frosts of autumn, maintain their rich foliage amidst the storms and tempests of the winter's blast.

veins, and when the frosts of Autumn come, this water, being a conductor of heat and life, conducts both to the air from which it was derived, and the repelling power dissolves the mass, and adds the product to the annual growth of the earth. And when this globe reaches its condition of repose, by perfect combination, and can accumulate no more material, it will reach it at the moment when the central sun, with all the planets that revolve around it, complete their structure; and the Clock of Time that has so long kept its records, will run down, and the transient night will be but the prelude to the morning of the resurrection.

THE FORCE BEING GIVEN WILL FURNISH EX-
AMPLES OF ITS WORK—GLOBE, HOW MADE.

Mechanically we could make a globe with a hundred cannon balls, each one foot in diameter, and begin it by placing two of them in contact, and they would touch each other only at a single point. These we would permanently seal to each other with a magnetic glue, and this glue we would transfuse into the two balls so that each ball would magnetize the next in order, till the globe was completed, and hold the whole mass together by this new power of attraction.

It is to be observed that every ball in this globe strikes the next in order on its curve, and that these angles with their cubes form curvilinear lines with unequal variation from the centre to the circumference of this body.

Now as repulsion moves from the centre to the circumference of this body through these curvilinear spaces, its momentum must instantly produce a revolution on its own axis in perpetuity.

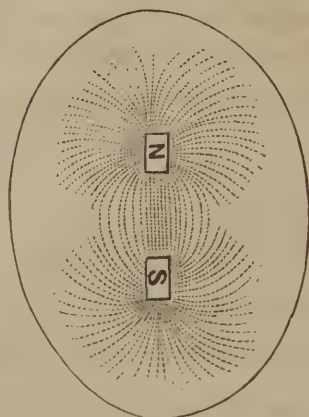
But the misfortune of this iron globe consists not in its form, but in the limitation of its motion to one direction only, and that, on its axis from West to East.

EARTH, HOW MADE.

The earth not only revolves on its own axis once in twenty-four hours, giving the succession of day and night, but it makes its annual revolution round the sun, and hence it is driven by a compound force of differing intensities in different directions, operating both ways.

The forming law being the sustaining power of all bodies, must give the gravity of all bodies, and hence the formation of the earth and its waters must be given by its forces.

The manner in which the foundation of the earth takes its form is shown in the following experiment: by supporting a sheet of white paper with a magnet in contact with its under surface, and then showering down iron sand from a sand-box held some inches above it, the particles of iron as they strike the paper will immediately assume the position to which these curves tend under the magnetic influence.



These lines formed by the sand afford a good experimental illustration of what are called magnetic curves, in which an infinite number of magnetic needles suspended freely will arrange themselves if placed in all diverse positions around a magnet. Now it is to be remembered that these needles are thus arranged by the very forces we have been demonstrating. When the particles are very small, the *attractive force* exerted upon them by the magnet, being the difference of its action upon the two poles of each particle, is *exceedingly slight*, while the directive or motive force is *very considerable*; the curvature of the lines is due to the continued action of the two poles of the magnet.

It is this force thus arranged that causes the angle of arches and forms spheroids of atoms of matter from which the earth takes its form.

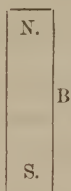
The line drawn round the circle of this cut will

give the egg-shaped form of the earth, and the first glance at its forces in the centre will give the differing intensities of its different directions in operation both ways.

The central magnet* has its line of forces running directly north and south with its axis, *not obliquely*, but *horizontal to its orbit*, and with its magnetic curves of unequal variation running from the centre of its axis towards its circumference.

FORCE OF THE CENTRAL MAGNET.

It is known that the effects produced by the opposite poles of the magnet are in some respects similar and in others dissimilar. The similar force is found to be the weaker power, and exhibits the relation which attraction bears to repulsion; the similar force is the one attracting what the other repels.



* This is a natural and not an artificial magnet.

Place the iron bar A near the pole of the magnet B, the iron becomes magnetised by induction, and the end of the iron S nearest to the pole of the magnet acquires an opposite polarity, while the opposite end of the bar the farthest from the magnet acquires the same polarity as the magnet itself.

First, the magnet sends its force into the iron bar from its north pole, and the end of the iron bar next the magnet takes an opposite polarity, and is attracted by the magnet.

Now let us suppose this force thus arranged to be laid in space ninety-five millions of miles from the sun, (for the sun will allow no nearer proximity,) and laid in the northern curve of its ellipsis with its centre magnet, four thousand miles long,* and with its south pole in a line with the north pole of the sun. The force thus arranged consists of oxygen with its attendant gases ballooned and in readiness for its gravity, and oxygen should attract hydrogen in such proportion as to make an ocean twelve thousand miles in circumference, (which, as every drop of water is a globe, it must be egg-shaped like the earth,) and it would be done and finished in the twinkling of an eye with its forces in full operation, revolving on its axis and moving southward on its ellipsis, with "darkness on the face of its waters."

* Allowance for growth.

ITS TIDES.

As every drop of water that enters into the composition of this ponderous mass is round and strikes on the curve of each other, corresponding spaces to those of the cannon balls, with proportionate cubes, must pervade the whole body, and its permanent elasticity, whose force being equal in opposite directions, will give its tides, rising and falling in proportion to the depth of its waters, twice in twenty-four hours.

Emerging from its winter night the twilight of the morning is seen in the coming rays of the summer's sun, and the light of day shines upon it.

Now the calcium and the carbon are uniting with oxygen to make the coral reefs, and the dry land appears, while differing proportions of the same elements are combining to make the sea-shells, and nitrogen joins the union, and the shell-fish appear, and animate existence begins.

Born in an instant, yet mighty in power, it is seen ploughing its way true to its ellipsis till its south pole strikes a line transversely with the south pole of the sun, and the observer is in terror lest opposite relations (not opposite momenta) should disturb its line of motion, (see Plate 2d,) but in four minutes he sees the infant earth* has cleared

* 65,000 miles an hour.

the sun and brought its north pole in relation to the south pole of the sun, when attraction being the weaker power, steadies its motion, while its ponderous momentum is driving it to the curve of its southern ellipsis. At this point the north pole of the earth swings into the line of the sun's axis, while its momentum carries it beyond it, (see Plate 2d,) and the motive force of the earth which allows no rest, impels it onward, and the sun refusing it proximity, it falls into the opposite ellipsis, (see Plate 1st, ferry boat,) and pursues its course till its headway strikes the line transversely with the north pole of the sun, and clearing it as before in four minutes, brings its south pole in relation with the north pole of the sun, (see Plate 2d,) which being the weaker power, steadies its motion, while its momentum sends it to its winter night.

At this point the south pole of the earth swings again into the line of the sun's axis, (see Plate 2d,) and its momentum carries it beyond, and the motive force of the earth allowing no rest impels it onwards, and the sun refusing it proximity, it falls again into the opposite ellipsis and follows its footsteps again round the earth.

Now the plane of this ellipsis on which we have shown the earth's revolutions, is not such an one as an astronomer would make, for an astronomer to

contemplate it is only a bird's-eye-view, designed to catch the eye of an observer.

Omniscience, in framing His law for the construction of the world, abhorred space and repudiated straight lines, and if we raise this ellipsis obliquely to the sun's orbit, we shall then have the true track of the earth around the sun, and from what we have already learned of motion, the footsteps of the earth around the sun will be more easily understood.

Let us first send a balloon around on this ellipsis with its parachute and man in it. A circle drawn around its area would be an oblate spheroid or egg-shaped, like the earth, with its axis horizontal to its orbit, and it would ascend on its plane of continued elevation 65,000 miles per hour, and reaching its winter quarters, discharge its gas and fall with the same velocity to its southern ellipsis.

Now it has been shown that the earth is a balloon* with its self-adjusting gravity and its directing force, and it is known that in its bosom it is perpetually generating hydrogen gas, and as perpetually throwing it off at its surface.

In all portions of this globe hitherto traversed by the white man, sulphurated hydrogen is found

* He who opens a fish is first struck with its balloon or air-sac, by which it varies its specific gravity, and enables it to dive deep into dense water or play upon its surface.

with its offensive gas spreading miles beyond its springs, and issuing from fissures through the surface of the earth.

Adjusted with this force, the earth can ascend any elevation and descend any plane, or poise itself in space as lightly as the eagle on its wing, and with its self-directing force governed by the power which the sun reserves to its own magnitude, it plays the part of satellite and works up to its time-table with undeviating certainty.

The difference between the two methods of coming to a conclusion is this—Sir Isaac Newton has demonstrated his problem of motion with an attractive force on an axis obliquely set to its orbit. We have demonstrated ours on a motive power with the axis horizontal to its orbit, barring gravitation.

We started in pursuit of different objects, he aiming at astronomy, we at the problem of life, and we have not for a moment lost sight of our model force in man in the attainment of our object.

To astronomy we make no pretensions, it is beyond our aim—the circle in which we move is a narrow one confined to that darkened chamber where human suffering bears in silence the stealthy footsteps of disease, cheered only by the sympathy and animated by the hope that the doctor knows how to do all that can be done for them; but how

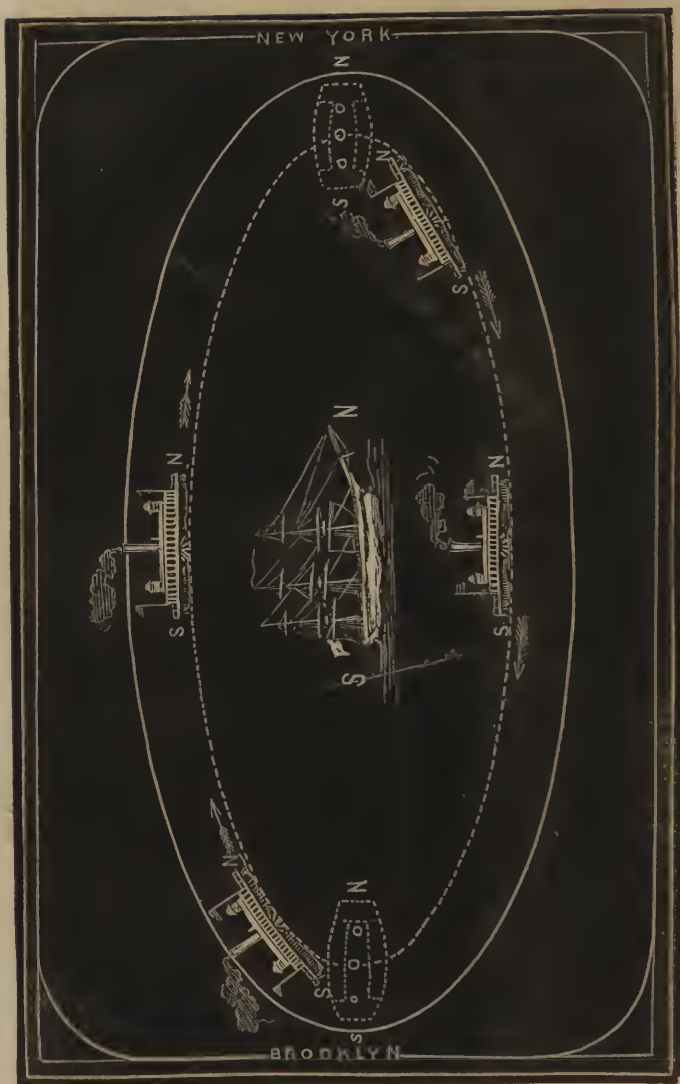
can these hopes be justified till we come to an accurate knowledge of the relations of life with matter, which the present demonstration assures us is within our reach.

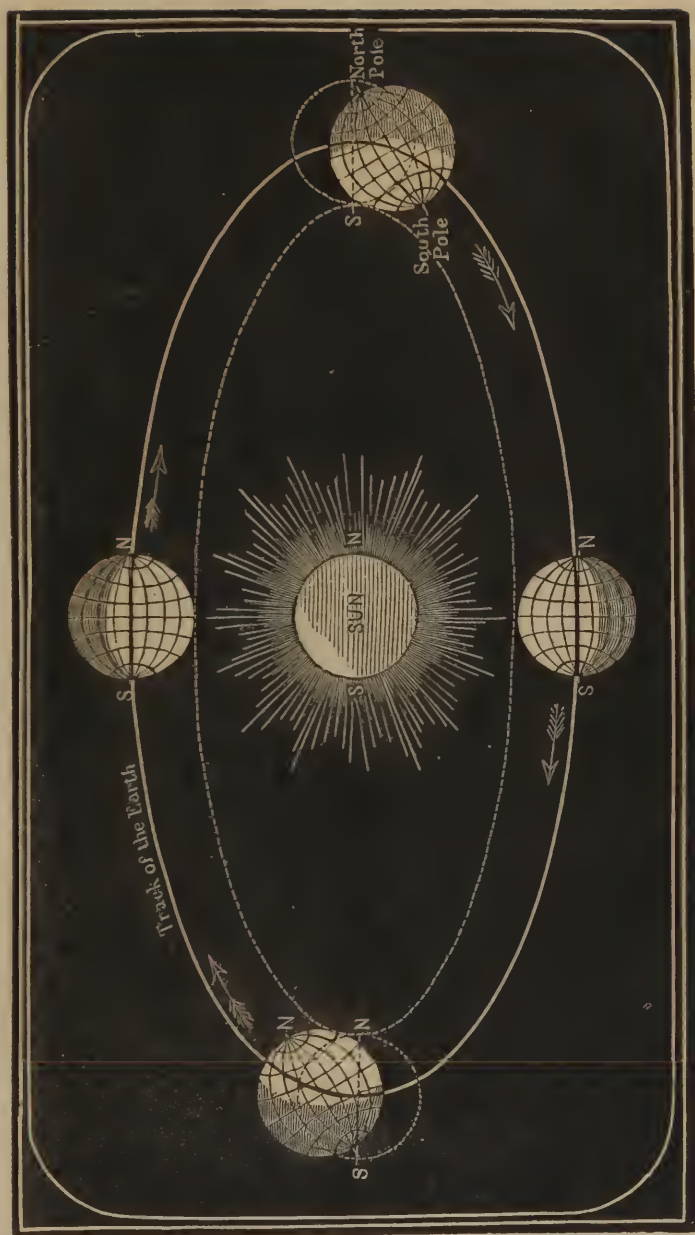
Disease is but the disturbance of the vital force, and with the knowledge of the force comes the knowledge to adjust it.

But for this our next inquest would lead us to the sun, the focal centre of the universe. Knowing that when oxygen is forcibly compressed in the fire-pump it emits both heat and light, and being incombustible, it radiates its heat and light without loss of substance, standing in nearer proximity to a *first cause* than any thing we can contemplate in this lower world, but yet unfolding to our vision the great truth, that the relative proportions of these gases that enter into the composition of the different planets, give every variety of size and degree of brilliancy from the sun, blazing in its noon-day splendor, down to the fading moon, as it sheds its soft rays upon the dew of the night.

MEDICUS

January 16th, 1857.





LAW OF UNIVERSAL CAUSATION.

HAVING left two affirmations behind us, that were not proven, one in the Problem of Mind, (page 8, Changing Relations,) and the other in the Problem of Motion, (page 24, Permanent Elasticity working by Law,) neither of which belonged to the proofs in these propositions, if we proceed further without first demonstrating the *Law of Universal Causation*, other doubtful points will accrue, which will call for new propositions to correct these aberrations.

We have demonstrated our problems of motion thus far on a motive power, made by a mechanico-vital force of differing intensities in different directions. The force being given, the proof lies in its law, and as the law stands first in logical order, and force is its power, we shall state the law to be that

of *changing relations*, whose force can make no two things alike, or, in other words, as it works by the clock of time, it cannot stop to make a duplicate.

Here we come again in direct conflict with the science of the day, which affirms the laws of nature to be the only laws that are absolutely unchangeable. There are two errors in this affirmation: first, in the plurality of laws. The special acts that spring from the necessities of a universal law, comprehend acts out of the ordinary course of the law, that are not at variance with its general principle. It is these special acts that give the erroneous idea of plurality—the second is its immutability. If the Law of Nature was *immutable*, that is, based on a fixed principle of adjustment, its phenomena would be always the same, and constantly repeated as they are brought before us, a standard would follow, beyond which there could be no improvement. All things being perfect, there could be no after progress.

The mind instinctively revolts from the proofs of this proposition, as our just expectations unfold to our vision the assurance that we are beings of endless duration, and that our hopes of happiness leaning on endless progression, would be extinguished by any law adjusted to this principle.

The immutability of this Law of Nature then is false in theory, and false in fact, as we see nothing in its principle or its phenomena *fixed*, but *change*, and strange as the announcement may appear, the forming and sustaining law of the Universe gives us all its *changing relations* in the figure 2. The proof lies in the compound force of numbers. In the government of this law all forms of matter being made of the same materials, are *necessary compounds** of each other, and mingle so invisibly with each other, that it has hitherto been found to be impossible to determine where one begins and the other ends—that between mineral, vegetable, and animal combinations there is no determinate line of distinction in the beginning of their structure—or, in other words, we can discover no beginning, middle, or end, in any of the works of God. One undeviating rule governs the whole in universal harmony, and by *changing relations* observes the following law. One atom of A may unite with 1, 2, 3, 4, 5 atoms of B. Secondly, one atom of A may unite with $\frac{1}{2}$, $1\frac{1}{2}$, 2, $2\frac{1}{2}$, 3, $3\frac{1}{2}$, or 4 atoms of B; and this combining proportion of all bodies in nature that unite with each other are represented by these numbers, the numbers themselves being spoken of as the combining

* Any atom of matter that is not a compound, acknowledges no relations or dependence, and is necessarily unchangeable and eternal.

proportions or *equivalents* of the substances they represent. Numbers then stand in the same relations to each other, as the combining proportions or equivalents in matter, and hence the problem of the figure 2, simple as it first appears to be, presents combinations so general as to be co-extensive with nature itself. It is at first difficult for the mind to conceive the illimitable range of any single number, or that parts of the number 2 form an aggregate of the remotest calculations in Algebra.

Whatever is made up of parts, is made up of parts of those parts. As we trace the relations of the number 2 with 1 and 3, we see it obeying the same law as the combining proportions in matter; it has neither beginning, middle, nor end.

If we set down the numbers 1, 2, and 3 in this their order of relation, we see that 2 is a compound of 1 and 3, decreasing by degrees toward the number 1, and increasing by degrees toward the number 3, so that its range is illimitable in both directions, as we can never reach the sub-divisions of number 1, nor exhaust the accumulations of number three.

It has no mathematical point, no centre, no sides, no beginning, no end.

Its very parts are degrees, and its degrees are deviations from 1 and 3, the degrees themselves being the difference, the difference is always *chang-*

ing,* and it loses its identity in its relations with 1 and 3. The force of numbers then lessens by subdivision in one direction, and accumulates in the other without end, constituting a force of *differing intensities* in *different* directions,† exactly parallel with the law of causation, and identical with it, as every change in numbers, whether by increase or diminution, brings up a new combination to the end of time.

But the subdivision in one direction with its cumulative force, gives us only the records of the past, while the accumulation of these *changing relations* in the future, unfolds its creative and reproductive force to be for ever reducing to its own system all the relations and dependencies of mind and matter, with the expression of acts in its general formula that furnishes its plan or evidence of design to accomplish, in a series of ages, the general good of the whole.

A law that has from the beginning introduced into our system new facts, and by persisting combinations will form new series of facts in the un-

* By the same rule the number 3 will lose its identity in its changing relations with 2 and 4, and the number 4 will lose its identity in its changing relations with the numbers 3 and 5, and so onward. The rule proves the law of atomic relations, where an atom at one moment is not, and is again in another form.

† See page 24.

broken order of their changing phenomena throughout all time. While its force increases in power in proportion to the number of combinations that enters into the mass, whether it be an atom, a man, a globe, or a solar system.

It is seen, then, that the force thus constructed works by the law of *changing relations*, on a strictly mathematical basis, so that numbers, and proportions of numbers, and geometrical figures, will express the relations of succession, with a rigorous certainty that no change of circumstance can defeat, till all things it has created have reached their condition of repose by perfect combination, when the central energies of every system of relations will dissolve the mass, and bring it into new combinations without loss of material.

ITS EQUIVALENTS.

This being the law which governs the whole series of universal relations collectively, it can maintain its operations on no other basis than this—that its exchanging relations are mutual equivalents equipoised on this scale of shifting equivalents, by the mutual exchange of material, it is always advancing by means of its perpetual combinations.

All chemical affinities testify to these equivalent

relations. Human life in its best estate, is tremulous with these exchanging equivalents, and in its indiscretions it is ever reeling in the disturbance of their adjustments. But we see this law of exchanging equivalents in its mutual relations, working nowhere with such undeviating precision as among the heavenly bodies, where, undisturbed by sensation, it calculates an eclipse to a second of time, and their revolutions on their axes by an exchange of equivalents, is to be calculated by the same rule. One of the most significant expressions of design in our planet is the great disproportion of dry land to lakes, rivers, seas, and oceans, eight ninths of which is oxygen.

The machinery of the planet being given, its central caloric measured, and its force demonstrated, the exchange of its equivalents for the generation of steam will give its motive power.

LAW OF DEVELOPMENT.

Having traversed the dark points of science with no companion but the mute guidance of the law, we are now approaching sunshine in the changing relations of life with matter, and in the higher relations of mind with both. Berzelius first discovered the proportion of elements that entered

into the composition of man, to range higher than the proportion of the same elements that composed the most exalted animal beneath him, and now it may be said they range higher than the multiple of all his prior relations to the physical world.

This disclosure renders him the monarch of matter, and the full measure of its forces imparts to him the consciousness of his ability to govern it. In him is found the focal centre of all the forces of the physical world, in combination with its physical elements. The minerals of the earth are constituents of his blood, and the relative forces of oxygen, hydrogen, carbon, and nitrogen, in his blood cells, give its motive power.

All his tissues are animate by this transient evanescent yet persistent force, ever coursing through a series of changing relations, briefly expressed by the term *development*. In his antecedent embryonic state, he is passing up through all the embryonic changes in animate existence beneath him. So that in these ever-changing relations is discerned his past and present.

Linked thus by structure and by plan to all that precedes him, he is made up and finished by the cumulative forces of the physical world. On this scale of ascending relations every thing beneath him, whatever it may be, beginning its structure in

lower numerical proportions, is an *arrest of development*, and it is these proportions that define the relations, and determine the difference in race and species.* But the past and the present has its future, and man held by the law of his antecedent relations, is himself an arrest of development rapidly approaching another change in his relations, that may place him on a plane of continued elevation in his next state of being.

ANIMATE EXISTENCE—ITS POSITION IN SCIENCE.

The bequest of Sir Isaac Newton gave us all his problems demonstrated on a centripetal force, with the method of his mind's working power from the circumference to the centre of bodies, and this pattern of his mind is the mould into which human thought has been cast for a hundred and thirty years; with the exception of the mechanic, who, knowing no law but the instincts of his mind, he, *and he only*, has been perpetually making discoveries in motive power at variance with this law,

* By multiplying the numerical proportions of any of the species with each other, it gives all the varieties of the species without transcending the race.

till patent rights have come to be the fashion of the day, and our domestic relations are made comfortable by motive powers that work from the centre to the circumference of bodies. But all abstract science adjusted to this law, overlooking the advance of opinion in the altered circumstances produced by the silent march of time, has been standing aloof, maintaining its ascendancy by the wand of its ancient authority, till every thing but *animate existence* has disobeyed its rule.

The theory of respiration is governed by this law—the adjustment of animal heat is regulated by this law—the anatomist demonstrates the remains on his dissecting table by this law, and the physiologist, following in his footsteps, demonstrates his vital forces by the same rule.

Now it makes but little difference to us whether a planet revolves obliquely, or horizontal to its orbit; but it makes a mighty difference to human life whether it revolves right or wrong on its axis. It is at this point that medical science must face its errors, and, however it may be shocked by coming to a full stop, it may oscillate and oscillate till it adjusts itself to its new centre of gravity, and then it must revolve the other way.

ANIMAL LIFE.

The force that demonstrates the revolution of a planet on its axis, is the same force that demonstrates human life, the degrees of deviation in vitality being the difference in the relative proportions of the elements that enter into the composition of the differing bodies. But the force of Law is only perceived in the practical application of its enactments to the purposes for which it was made, and this is seen in the mute testimony of the magnet in its application to the paper in the cut on page 32, when the particles of iron as they are showered down upon the paper repel each other.

It is this motive force in the magnet that determines the centrifugal force to be the stronger power, while the continuity of the force by attraction in arranging the lines of unequal variation into form, determines it to be the *weaker* power.* This proof addresses itself to our senses, and with its passport we are introduced to the eccaleobion or hatching oven, which unfolds to our vision the changing relations of animal life from its salient point to its perfect development.

* Attraction is not a force per se, it is only attractive, as the proportions of its relation to its motive power become more and more unequal, while its vis a tergo never ceases.

In six hours after the egg is placed in the hatching oven at 98 Fahr., the opaque nucleated germ of the future chicken begins to differentiate, and in twelve hours its atoms are separating with more activity, and are seen to be concentrating at diverging points. In twenty-four hours the outline of the heart appears in the form of a horseshoe, and pulsates with no blood in it. A central line is already formed toward the head, and the trunk is outlined with no limbs. In the early footsteps of the third day, two vesicles of blood appear, where the left ventricle and origin of the aorta are unfolding, with *visible pulsations*, while at the same time the auricle turns up like a noose folding on itself, and before the close of the day, the extremities, the wings, legs and *head* are seen simultaneously rising out from the mass—the head by three points or globules, one for the bill, one for the cerebrum, and the other for the cerebellum. In the progress of the fourth day, the two auricles become visible and are drawing in nearer proximity to the heart, and in the access of the fifth day it is taking its position, and in eleven hours more voluntary motion is perceived—the bill opens and shuts—the breast is forming, with the ribs, spine, and gall-bladder, and in seven hours more the stomach and lungs are apparent—in four hours the intestines, loins and up-

per jaw take their respective positions. At the beginning of the sixth day, the two ventricles are outlined and two drops of blood are seen in more active pulsations.

On the seventh day the cuneiform bone is laid and the arch of the skull, sprung and brain begins to deposit on its floor.

From this period all the focal points being determined, the observer notices only the gradual development from hour to hour, in filling up and setting the organs into their relative forms and places, when on the tenth day if the chicken be taken from its shell it moves itself. On the eleventh day it begins to feather, the skull is rounding into shape, and the eyes appear. On the twelfth day the ribs are perfected. On the thirteenth day the spleen is drawing nearer the stomach and the lungs to the chest.

On the eighteenth day all the limbs are visible, and the first cry of the chicken is heard; and on the twenty-first day when the chicken clears its shell, in proof that force makes its own matter and its law is reproductive, the chicken is heavier than the egg it came from.

RECAPITULATION—WHAT HAVE WE GAINED?

We have demonstrated the error of Sir Isaac Newton in deducing a universal law from a centripetal force, and proved his law to be but half—and that the weaker half—of a motive power. This motive power is shown to be derived from the permanent elasticity of oxygen gas, whose action and re-action, is governed by the law of changing relations with equivalents, and the first substance made by this force was water.

HUMAN LIFE—ITS WATER.

Water was the first binary form of matter that announced the beginning of the physical world, when darkness was still on the face of the deep. Of its mighty agency among the atoms of matter, we know less than is yet concealed from us; but we know that it partakes of the geological character of all countries and places wherever it is found. All the natural waters of the earth, are proved, by analysis, to hold in solution some or all of the mineral bodies that constitute the structure of vegetable and animal life; and it enters as a constituent element into all the minerals or masses or atoms of matter that make up the body of the globe.

It is known too that seeds may lie dormant cycles of years, and when moistened with water resume their activity and vital force: that animalcules may be kept dry for ages, and when moistened with water are restored to life. But our pursuit is not in its general properties, but in its special functions. Made of a permanently elastic force, it is permanently elastic in itself, and the law of changing relations, that governs its action, must be void, if in this first form of matter there does not lie the secondary cause of all *other forms of matter* with the elements of their life and motion.

Eight-ninths of its weight is oxygen, which gives the element of life to all its combinations, and its permanent elasticity gives the element of motion to all its changing relations. It is this elasticity which gives tides to the ocean and impulse to its mountain wave, while in its delicate relations it trembles in the dew drop, and expresses the sympathy of the heart in its tear.

Its drop is a duality, and like the digit 2, it does not represent itself, but stands, as the tear, the representative of its relations. But while the digit 2 represents the law of dual relations, the drop of water brings the law, with its rule of action, into combination with matter, where it proves itself to be the force we have been demonstrating; and here

we take our stand point, that in this first substance, this drop of water, lies the secondary cause of other substances, or forms of matter, with the elements of their life and motion. Water takes its substance and its form from its gases. Apart from its gases, it has neither substance, form, nor existence. *Ergo*, matter, apart from its water, has neither form nor existence. *Ergo*, it is water that makes matter, water that decomposes it, water that brings it into every new form and combination, and mode of action, of which matter is susceptible. And as water is a spheroid, its masses of matter must all be, more or less, spheroidal, making no straight lines without their corresponding curves.

Leaping over the crystals made by professional chemists, the first proof of these watery forms that we desire to lay before the reader, lies in the crystals and their colors, that water makes in ice storms. The frosts of autumn make their crystals too small for observation by the naked eye; but the ice storms that cover the blades of grass and trees with their crystals, exhaust all the admissible permutation of changing relations in the beauty and brilliancy of their colors, and in obedience to the law that water can make no two colors alike, it can make no two crystals or things alike. Over any given area where the snow may be ten feet deep, no two snow-flakes

crystallize in the same form. In vegetable life it makes no two plants, or flowers, or shrubs alike. There is no tree in the forest that observes the same curve in its arches, no two leaves on the same tree that may not be told one from another. In human life it makes no two beings alike,* and no two sensations alike, nor any two minds alike that spring from sensation, and the moral natures diverging from these never take the same pathway.

And in this ever-varying and yet agreeing conformity (the waters being lost in the spread of their relations), it is by long attention only that the conception of its presence, hinted at by all things yet assumed by none, is fixed upon the mind as the standard of truth that in water lies the physical forms and vital forces of the whole physical world.

The second proof will be found in human life in the proportion of water that combines with its tissues. This is given by taking the average proportion of water in the brain, the blood, blood-cells and muscle. The brain holds $\frac{7.2}{100}$, the blood $\frac{8.7}{100}$, blood-cells $\frac{7.6}{100}$, and muscles $\frac{8.5}{100}$. The average proportion of water in these four relations is $\frac{8.0}{100}$, which gives four-fifths by weight of water to the tissues and leaves $\frac{7.1}{100}$ of oxygen for the generation of heat and support of life.

* The saliva of woman shows a higher combination of water than that of man.

This primitive adjustment of oxygen for the maintenance of life, has been overlooked because it was in water; and there is no science which the mistake has not reached, no thought it has not impaired, no mind it has not misled, and no judgment it has not perverted, and its consequences to human life no one can calculate, when we examine the phenomena of respiration and see it as it is. The human mind leaving this great disproportion of oxygen in the tissues behind it, has sought till it has seen the generation of animal heat in the lungs by means of oxygen in the air inspired. Animal heat is the most important function of animal life, and in the present state of science the least understood.*

Every animate existence springs from a germ, and the proportion of water in its cell is the standard of its vital force and motive power. The germ makes its cell,† and its wall being elastic by means of its water, it pulsates. These germs differ from each other in their simple or granulated forms. The germ from which human life is developed is studded with granular tubercula on one side of its utricule from which the semilunar ganglion springs. In this ganglion rises the pneumo-gastric nerve, the matrix of the nervous system, whose pulsation is action and reflex action, and when carried out from its nucle-

* See appendix A—respiration.

† See appendix B—cell.

ated point to its widest spread relations, constitutes the action and reflex action of the nervous system first pointed out by Hall. Immediately from its root springs the great sympathetic, and in the mutual interaction of these dual relations, the one makes the mind and the other the matter; and the solar plexus, the great battery of human life, rises from this combination, and radiates 12 pairs of nerves from its centre, charged with *sensation, circulation, and voluntary motion*. The pneumo-gastric nerve, with its subordinate relations, having arranged the great registering ganglia of human life, reappears on another scale of ascending relations dignified with the office of a physico-mental nerve.

Its priority of origin* gives it this pre-eminence, and now we find it to be the agent for the transmission of heat from the solar plexus to its extending relations. When these nerves are cut the thermometer placed in the tissues shows a direct fall of the mercury, and the body cools inversely from the circumference to the centre. But the distinguishing feature of this nerve is evinced by its authority in choosing or refusing its branches to adjacent organs. As they rise from the solar plexus and terminate at the floor of the fourth ventricle of the brain, the order of

* The mollusks, in the lowest scale of ascending relations, have the pneumo-gastric nerve; above them, the sympathetic is added.

distribution in their branches *in time*, is not in accordance with the succession of branches they afterwards throw off in their course to the brain. It passes by the stomach and throws its first branch to the heart, which is seen to pulsate its own development without the appearance or presence of blood. Then its central line is continued to the brain, and the trunk of the body is outlined, and our attention is at once called below to two vesicles of blood in the ventricle and origin of the aorta, which, like their antecedents, pulsate, and looking upward again three focal points are seen to be gradually unfolding, the cerebellum, cerebrum and bill, and are approaching each other to form the head. We then behold the auricles drawing in nearer proximity to the heart, and when the liver appears the combination of organs is sufficiently developed to produce voluntary motion.*

Then what has been hitherto supposed to be primary organs, as the stomach and lungs, turn out to be secondary developments, and these are followed by the grouping of the intestines and loins, and then the upper jaw appears, the under jaw having been previously formed. Next, in order of time, the ventricles appear, with two drops of blood

* Appendix C—voluntary motion.

obviously beating on their own account, but a closer inspection discloses the force of water acting and re-acting in these vesicles as it does in every other tissue. The water of all the tissues of the body in the temperature of 98 Fah. is the immediate cause of the pulsation and motive force of the circulation of white blood, whose unbroken channels with the circulation of red blood gives *its* momentum, and explains the phenomena of the general circulation.

After the ventricles are adjusted, and the general circulation established, the arch of the skull is sprung, and, with its floor laid, the motor track extends from the medulla through the great median fissure under the hemisphere of the brain, and by its nervous connections there, constitutes an isolating apparatus for the nervous supply of the *vivid senses*.

And lastly, the two hemispheres of the brain, the final combination of dual relations, completes the structure and defines its prior relations, by setting a door-keeper at the terminus of the Crura Cerebri.

This door-keeper having apparently no nervous relations, closes the council chamber of the soul from the bewildering emotions and rapid conclusions of the vivid senses below, and enables the reason to review these conclusions and render its judgment

upon the facts brought before it. These vivid senses are the four senses of taste, hearing, smell and sight, and are made in this order of their succession before the brain and sense of touch have the physical extension for their functional development. These senses are all dual relations, and the priority of their development proves their contemporaneous formation by the physico-mental nerve in its course toward the brain, giving off as it passes up the papillæ and sense of taste to the tongue.

As we are now entering into the focal centre of all dual relations, it may be well to state, that the law of changing relations is a dual law (that is, it renders every thing a compound of binary form relations), and it admits of no other combination than the multiplication of dual relations into each other.* The human body itself is a dual relation. One side may be palsied and the other not. The tongue has two halves with their unequal tastes to bring unequal flavor to a standard of adjustment. Objects of vision have different relations which the two eyes adjust to a standard of observation.

Odors and sounds are governed by the same law, as well as the expression of the face, the two sides of which being unequal, gives the standard of expression; and the nearer they approximate to equality,

* See Appendix D.—Law of Changing Relations.

the less striking the face, and as the degrees of variation lessen, it approaches nearer and nearer to vacuity. If we turn from these relations to the solar plexus, we find there dualities in direct correspondence with these vivid senses—sensation, association, memory, imagination, will and conscience.* Of these six dualities, memory and imagination being dual relations and one and the same force of differing intensities in different directions, constitute the focal centre of the two wings, by which the memory brings up the records of the past to the present moment, while the imagination is introducing the future to the mind.

Thus enforced, it is a triplicate duality, and its focal centre is the tongue with its triplicate duality. Its first duality is its two sides, its second its two tastes, its third its two sets of muscles, all of which are given by the two physico-mental nerves, and render the tongue the organ of expression for the feelings of the soul.

Having considered the sensational attributes of the vivid senses, with their mutual relations and dependencies, we come lastly to the consideration of the sense of touch.

Touch distinguishes man from all other beings. In animals it is a sensation, in man a perception ;

* See p. 6.

and its importance is only known when measured by the sense of sight. Of the five senses, only two, sight and touch, spread their sensations over extension, and each of these over a different extension. There is, at the same time, the most constant relation subsisting between the two, and the relation is so uniform, that whatever affects the sight may affect the touch and the converse. The vastness of the field over which the faculty of vision gives us a command, together with the precision and permanence of this class of perceptions, impels us almost irresistibly to believe, that in spite of the wrong adjustment of the eye, nothing material can escape it. But the presumption that the eye sees whatever is material, fails on a closer examination. Suppose a substance or a property of matter to be placed at a given distance, within the axis of vision, and this property or substance should bear no analogy or resemblance to any other property or substance of matter which had been before embraced by its focal powers, what impression could the eye give of its material properties? Clearly little or nothing. Apart from its color and general contour, nothing. Close the eyes and submit the substance to the sense of touch, all its essential properties are at once known, and discriminated.

We forget from habit that our vision is correct-

ed by the sense of touch, and that our desire to feel what we see is the impulse of a detecting power to learn what a weaker power cannot give it. The phrenic nerve was christened by the spirit of inspiration, as it originates the sense of touch and carries its information to the brain. Its relations to the physico-mental nerves and solar plexus, and its connections with the subclavicans as they course to the hands, and with the vocal muscles and cervical branches that land it in the medulla itself, where the sense of touch was found by Muller's experiments, and sent through its prolongations to the brain, assure us of its track and of its offices.

The impulse it receives from the sense of touch, is the standard of its rate of motion. As it is designed for a deliberate sense, it cannot be a vivid one. The facts it examines and the evidence it bears require it to act singly and alone, weighing its testimony slowly in arithmetical progression, and in equal quantities, and the evidence it bears to the brain is taken there by one witness, and with closed doors this court of equity reviews the decisions of the impulsive court below, and renders judgment in accordance with the facts brought before it.

The human mind thus made up and furnished in a duality—the senses of sight, smell, taste and hearing are all vivid senses, and gain and give up

their sensations to the memory on the passing moment, while the sense of touch is less vivid and more lasting, holding its inquest with thoughtful deliberation, and weighing its testimony with discriminating care.

It is at once seen that perceptions so different in their sensibilities, but more especially in their rates of motion, cannot have the same focal centre for their different theatres of action.

The vivid senses must have a vivid centre, whose organic transitions are in exact correspondence with its rapid motions, while the sense of touch must have a table on which to write out the slow record of its evidence.

MEDICUS.

APPENDIX A.

RESPIRATION.

Extract from the Annual Address of the Author, delivered before the Academy of Medicine of the State of New York, February 19th, 1851.

The popular theory of respiration on which all calculations of life and health are founded, is, that animal heat is generated by introducing oxygen into the lungs by inspiration; that the process of breathing separates the oxygen of the air from its hydrogen, when the oxygen unites with the blood in the general circulation, and a chemical union of the carbon and oxygen is effected, by which the carbonic acid is expelled from the system through the lungs, and, by means of oxygen thus supplied, animal heat is generated.

This theory is the foundation of the superstructure of life and health. Now, though the teaching of positive truth is the grand means of expelling error, the process is sometimes quickened by the negative argument serving as its pioneer. You will be surprised to learn that no experiments have been spared to confirm this theory, and not one of them has pierced the darkness that mantles its birth.

Negatively considered, if the lungs generated heat by means of respiration, it would seem to imply the power

to increase or diminish the standard of heat by multiplying or withholding the number of respirations per minute. But this is not so—no variableness of breathing alters the temperature of the body, while, on the other hand, every man's experience assures him that he generates heat by motion, and that he is soon compelled to breathe fast to cool himself. But in proof of the position we now take, that breathing is a cooling process, we cite for examples the whole animal world, except the genus *homo* and the genus *horse*, and these are not exceptions to the law, only to the rule.

The genus *homo* and the genus *horse* have a double privilege of refrigeration, while all other animated beings have but one. You may be surprised to learn that no other beings sweat except men and horses, and hence no other beings can cool themselves, when hot, by perspiration through the skin. The confirmation of this fact is found in the whole range of comparative anatomy, where nature has furnished examples on the most extended scale of magnitude, in the whole animal world, in the largest as well as the smallest of beings.

In all the *pachydermata*, or thick-skinned animals, except the *horse*, are found no pores in the skin that exhale heat by perspiration, the envelope on all these animals being only a secreting surface, like others of the internal surface of the body. All the cleft-feet species, including those presenting feet with toes rounded, and unprovided with claws, the elephant, rhinoceros, bison, mammoth, mastodon, buffalo, ox, swine, deer, as well as the lion, tiger, bear, wolf, fox, birds, squirrels, dormouse, opossum, raccoon, all alike offer the same examples as the dog, that they have no other means of cooling themselves when hot except through the medium of the lungs, by respiration.

The farmer drives his oxen, in the summer heat, with

great care, and when they open their mouths and thrust out their tongues, and pant to exhale the heat generated by exercise, if he does not stop their motion, they die with the heat that accumulates within them. His hogs, too, must be driven with more care, and if they are allowed to grow fat in hot weather, they often die, panting, in a state of repose, when in the shade.

All these animals, with the exception of the elephant and rhinoceros, are covered with hair and fur, or feathers and down, which varies with the climate.

The fur and down tribe throw off their rich covering at the approach of spring, and revel with their fellows in a summer's sun, and, as the autumn returns, they are refurnished with their furs and down, in anticipation of the winter's frost.

In health, these animals have a large deposit of fat beneath the skin—fat is a mixture of two or more ingredients, which differ from each other in consistency—in most instances they are stearine and margarine, along with a liquid oleine; as the weather cools these oils and fats condense, and as they solidify they become non-conductors of heat, and as the heat accumulates beneath the skin, it generates the delicate furs and down for winter's use; and in the spring, as the temperature rises, the oleine becomes volatile and sheds them again for the summer's heat: so that this simple law for the generation of heat, in animal as in vegetable life, is graduated by the fluctuations of the season and the revolutions of time. The familiar example of the dog, who generates his heat at the expense of his substance, as he increases his speed, and, having no pores in his skin, he multiplies his respiration in the ratio of motion, as the only means of keeping himself cool, and having no perspiration to check, he plunges into water with impunity, and returns refreshed, when men and horses, submerged in a similar condition,

would suddenly check perspiration, and if they survived the shock, it would be to die with acute or chronic inflammation.

When nature furnishes examples on such an extended scale of operation, for the escape of animal heat, it would seem to deprive the phenomenon of respiration of much of its fictitious value. There are some experiments that have been performed, by introducing foreign bodies into the venous circulation, that are very significant in their results. When mercury is injected into any part of the general venous system, it is invariably found in the lungs, the lungs being the inevitable outlet for all foreign bodies introduced into the general venous circulation. In conclusion we state, that apart from these experiments and the examples of animal life, the only *chemical action* which animal life is known to possess, and the only one which is perfectly known and accurately measured, is the excretion of carbonic acid from the lungs, in the form of watery vapor, which carries off with it the surplus heat as the animal system generates it.

Having stated, as I trust, satisfactorily, that breathing is a cooling process of life, we come next to the consideration of the true and only cause of the generation of heat in man. The analysis of the saliva, gastric juice, chyle and blood, has proved the first process of its formation to be effected by the agency of water; if we now show from whence the water is derived, the chain of testimony will be finished. Liebig has established all the phenomena of the generation of heat acceptably, but overlooking one of its most important facts (the proportion of water in the tissues), he left the mystery as he found it, in its primitive darkness. He had a clear conception of its phenomena, in ignorance of the principle that heat was generated by the oxydation of the tissues; and in the same manner as fire is generated by the de-

composition of the wood it burns up, and that both are governed by the same law; in short, that the body is consumed, wasted and transformed by the generation of heat, precisely as any other ignited substance, and parts with its heat to surrounding matter as that of any other heated mass. That oxygen in both cases combines with the carbon and hydrogen; in both cases the same product is given out, namely, heat, carbonic acid, and the vapor of water; that its generation is rapid in proportion to the loss of substance by exercise, creating a rapid transmutation of the tissues of the body. So that life is a fire, the body its furnace, and the aliments its fuel.

After knowing and saying so much it would seem impossible that so distinguished an author should fall back and seize upon the same errors that were common to his predecessors. If his mind had not been so carefully instructed in the errors of respiration, he would have seen that more oxygen is introduced into the stomach in one minute by a tumbler of pure water, than could be introduced through the medium of the lungs by inspiration (if they could admit it) in several hours.

In ordinary health the average weight of water drunk by a healthy man is about thirty-two ounces per day, while a hard laboring man will often drink from sixty to seventy ounces per day, the quantity being proportioned to the transmutation of the tissues, by the generation of heat and muscular motion.

In every thirty-two ounces of water, the average daily supply of a healthy man, are found twenty-eight ounces and four-ninths of oxygen. Eight ounces of bread is a low average of daily consumption, and this contains two ounces and a half of water, while four-fifths by weight of animal food is water, and if we calculate one pound of this to be the average weight daily consumed, it will yield fourteen ounces and two-ninths of oxygen, which foots up

the account in round numbers to about forty-four ounces of oxygen daily introduced by degrees into the stomach of a healthy man, which is twelve ounces more than the advocates of pulmonary absorption claim to be sufficient to effect the gradual decomposition of all the hydro-carbons and nitrogenized substances that enter the system in the form of food.

Now here is a dilemma. If thirty-two ounces and a half of oxygen were daily introduced into the system through the medium of the lungs, and thirty-two ounces and a half be sufficient to generate animal heat for twenty-four hours, what conceivable force could restrain the spontaneous combustion of the body, if forty-four ounces should get into the system by some other channel, that had been overlooked. Apart from all these plain, simple, and obvious facts, the experiments by the thermometer repudiate this generation of heat in the lungs, as the standard of heat by this instrument ranges from one-half to three-fourths of a degree higher in the stomach than in the lungs. In this central organ combustion begins by the rapid mutation of water, vegetable and animal food, as they are converted into starch, alcohol, lactic acid, and chyme into chyle, wherein every stage of the process from the development of one substance into the next in order, evolves an accumulating force of animal heat. The chyle is then conveyed into the receptaculum chyli, heated a little above the standard heat of the body, and ascends through the thoracic duct, is conducted from thence into the subclavian vein, from thence into the heart, from whence it is driven into the lungs (just as the sap is driven into the leaves of the tree), not for the purpose of being heated, for it returns cooled, but for the purpose of excreting the effete matter immediately derived from crude materials, and is then prepared for the general circulation, when, as it returns, it parts with its

infinitesimal deposits among the various solids of the body, evolving animal heat in the ratio of the conversion of fluid into solid matter.

It is now, I trust, very obvious to my audience how the human system generates its heat. No matter what the temperature of the food may be when taken into the stomach, it is immediately raised to that of the blood. A tumbler of iced water at the temperature of 32° is raised to that of 98° in one-twentieth part of the time that it could be heated to that degree in the blaze of the hottest fire. Now if there was no appointed outlet for this rapid generation of heat, what would become of the animal system? It is plain it could not maintain its standard at 98° , but must run at once into fever and from thence into combustion. In order to maintain its average standard of heat at 98° , there must be a provisionary arrangement for the escape of the accumulating caloric, and this has been proved to be through the channel of the lungs by expiration.

Educated errors enter into permanent combination with the feelings of the mind, and engender prejudices that no exercise of judgment can conquer, and it may be years before this truth, so obvious to the senses, will be accepted by the profession.

APPENDIX B.

CELL.

This cell is now but an atom of matter, and the condition of its existence is space and extension. Professor Pierce supposes space to be a vacuum that pre-exists, and "its extension to be a continuity of continuities." *

* Smithsonian Lectures.

If this atom of matter held no relation to space, where would its extension end? If space be extension, and extension not a force, the matter that floats in space could be held by no law. But if space be extension, and extension a force that is made by the gases of creation, then it is governed by the law of changing relations with equivalents, and the matter that floats in space is governed by its rule.

Under the old law that matter was "essentially inert," it occupied no more space than it covered, but under the new law matter is a force, and occupies more space than it covers.

Let two blocks of wood, of equal magnitude, be placed in contact on the surface of smooth water, and they will repel each other, and the spaces they respectively occupy will be the cube of the square of each block.

Matter by this experiment is a force, and occupies more space than it covers.

Now let us take the cell. Let the specific gravity of this atom of matter be 1, and the space it occupies be $1\frac{1}{2}$, what relation will the square of 1 hold to the cube of the space it occupies?— $1 : \frac{2}{3}$ or $1 : 3\frac{2}{3}$; that is, the atom makes its own space, in which to move in the proportion of $3\frac{2}{3}$ to 1, and if we take the next higher combination of matter, it will show geometrical extension.

Let the specific gravity of matter be $1\frac{1}{2}$, and the space it occupies be $2 : 2\frac{1}{2}$, what relation will the square of $1\frac{1}{2}$ hold to the cube of the space it occupies $(1\frac{1}{2})^2 = 2\frac{1}{4}$; $(2\frac{1}{2})^3 = 15\frac{5}{8}$. Space, when considered as extension, where silence reigns with companionless relations, is painful to contemplate. But when space is regarded as extension, and both are contemporaneous with matter, and all are made at the same time and by the same force, and worked by the same law, the scene animates.

The changing relations of gaseous forms in space have

more harmony, more sublimity, more beauty and more activity, than in proximity with matter. They are the paintings of Him, on whose arm creation hangs in safety, and whose easel of endless combinations sends its colors over space, whose boundary is extension, and whose law is His own.

They are not only changing relations with each other, but with the matter that floats on their surface, and in proportion to their density and their volume, they float planets on their planes, as the waters of the seas float their ships. Take oxygen from water, and where would ships be found? Take it from the air, and what would become of the universe of worlds? The crash of planets, crowned with death, would answer in the coming gloom.

APPENDIX C.

VOLUNTARY MOTION.

Professor Childs says (I quote from his address to-day to his graduating class) that the *vis medicatrix naturæ* is the motive power, and charges "with severity" that the Homœopathists believe in the "subtile vital power."

May we ask the Professor, what the difference is between these two powers, except it be in the form in which he has written their names. The "*vis medicatrix naturæ*" is written in italics, and the letters all lean one way; but the "subtile vital power" is written with letters that all stand upright, and lean no way. We say the "subtile vital power" is sensation, and sensation moves the mass, and the antecedent of sensation is the force that moves all things.

When we sleep, we move ourselves by sensation; when we awake, we move ourselves by sensation too, but *then* the motion is guided by the will. (See P. 12. Will.)

APPENDIX D.

CHANGING RELATIONS.

The law of changing relations with its equivalents is enforced by the original gas of creation. This gas is a triune force, and is the first and only example of a triune rotation, that has been submitted to our inquest.

It stands thus : oxygen to hydrogen $\frac{1}{1}^6$, to nitrogen $\frac{1}{4}^6$ to carbon $\frac{1}{6}^6$, which gives it the entire command over matter and motion, and, still holding in its hand these triune forces, it reserves to itself one, and that one encloses the secret of the relations of heat and life. But it gives us the two, on which is based the dual law of changing relations with its equivalents, and as there is no loss of material in the working of the law, there is no profits made by Him who made the law. It is conducted with such rigid economy, that an atom of matter would be instantly missed and felt in the universe.

Every problem that this dual law lays before us is open for discussion, but upon the problem of the relation which is reserved, the signet of silence and submission seals up the progress of human thought.

Absolute and uncompromising in its rule as this law of changing relations may be, it exercises no arbitrary power; the exact equivalent is always given. Every thing it unfolds is marked with its price, and there is none so poor he cannot buy it.

The giving himself up to it is the price he pays, and the equivalent is always given; and given in the one thing he seeks, for he cannot have two. If it be wealth he wants, he earns all and spends none, and wealth comes, and the equivalent is in its possession—no benevolence ever beams upon his pathway in its distribution.

If it be pleasure he wants, it comes, and its equivalent

is found in its attendant miseries. If it be happiness, it comes, and the equivalent is an approving conscience.

The whole law of changing relations may be summed up in those paradoxical texts, found in 10th and 16th chapter of Matthew—8th of Mark—9th and 17th of Luke, and 12th of John, either of which states the whole law:—
 “Whosoever shall seek to save his life, shall lose it, and whosoever shall lose his life for my sake shall find it.”



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